Final Report

SUGGESTED IMPROVEMENTS TO CINCINNATI'S PERMIT FEE STRUCTURE FOR THE STREET RIGHT-OF-WAY PERMIT PROGRAM

Research Performed Under
Contract No. 45X5283

Sponsored By
The City of Cincinnati

Submitted By

Rajagopal Arudi
The Cincinnati Infrastructure Institute
University of Cincinnati
Cincinnati, Ohio 45221-0071

February 2000

DISCLAIMER

The contents of this report reflect the views of the author who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or polices of the Cincinnati Infrastructure Institute or City of Cincinnati. This report does not constitute a standard, specification, or regulation.

ACKNOWLEDGMENTS

This report includes the results of a study conducted by the Cincinnati Infrastructure Institute, in cooperation with the Engineering Division of the City of Cincinnati. The author wishes to convey his appreciation to Messrs. Prem Garg, Walt Pegram and Joseph Flading of the Engineering Division for their effort which contributed to the success of the project. Special thanks to Mr. James Ginocchio, Assistant City Solicitor, for his outstanding cooperation and many contributions. The support rendered by Dr. Issam Minkarah, Professor of Civil Engineering and Dr. Channakeshava, Visiting Scholar, in reviewing the report and providing useful comments is duly acknowledged.

PREFACE

This study was initiated to review City of Cincinnati's permit program, compare the City's street rights-of-way (ROW) practices and policies with other communities, identify true costs of the permit program, and suggest a new, rational, permit fee structure. This report suggests a new fee structure based on the following:

- A review of ROW practices and policies in other communities;
- A field investigation of impact of utility cuts on performance of street pavements by the Cincinnati Infrastructure Institute;
- A study of pavement life and life cycle performance of city street pavements by CII; and
- Extensive discussions with the City's staff.

The proposed fee structure considers all the estimated direct and indirect expenses to support the permit program and to maintain the physical assets. The City should judiciously use the suggested procedure to revise the existing permit fees and upgrade the permit program.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUGGESTED IMPROVEMENTS TO CINCINNATI'S PERMIT FEE STRUCTURE FOR THE STREET RIGHT-OF-WAY PERMIT PROGRAM

BACKGROUND

Utility companies such as Water works, Gas, Electricity, Sewers, and others frequently cut open parts of street pavements either to install new utility services or to access existing utilities. Although these utility companies restore the cuts and the pavement sections according to available guidelines, often it is observed in the City of Cincinnati that, the pavement within and beside the cuts fails prematurely. The resulting condition has a direct influence on pavement integrity, life, maintenance cost, aesthetic value, and safety of motorists. Recognizing that Cincinnati's permit division issues about 5000 permits in a typical year, controlling the quality of restoration is a challenge.

To maintain the street pavements affected by utility cuts, Cincinnati has set up a permit program aimed at recovering direct and indirect costs from the utility companies. However, city officials believe that this cost recovery policy is not based on systematic methods of performance evaluation, and the amounts recovered, often, are grossly inadequate to maintain the pavement section. So, two critical questions to be addressed are: (i) what is the damage? , and (ii) what is the appropriate cost to be recovered? . As the existing permit program does not fully consider the effect of utility cuts on pavement performance and resulting repair costs, the City of Cincinnati, is currently seeking specific guidelines to address the following issues:

i. Impact of utility cuts on structural integrity and performance of pavements;
ii. Monetary impact of utility cuts on street maintenance and rehabilitation programs; and
iii. An appropriate cost recovery policy that would be acceptable to the city and utility companies.

An investigation carried out by the Cincinnati Infrastructure Institute (CII) between 1991 and 1995 (Reference 1) for the City of Cincinnati showed that street repair costs due to poorly restored utility cuts far exceed the permit fees. Currently, the City's rehabilitation funds are being used to repair failed restorations. This report suggests a procedure to upgrade Cincinnati's street permit program and revise the permit fee structure. The procedure outlined in this report is based on a

detailed investigation of direct costs, and the costs associated with strength and performance characteristics of utility cuts.

PRESENT STUDY: OBJECTIVES AND SCOPE

The City of Cincinnati has retained CII to review the City's permit program, compare the City's street rights-of-way (ROW) practices and policies with other communities, identify true costs of the permit program, and suggest a new, rational, permit fee structure. The specific objectives and scope of the present study are as follows:

- Review permit programs in U.S. cities using published records/documents and by conducting a search on the Internet;
- Review Cincinnati's permit program;
- Identify the true costs of the permit program; and
- Develop a new, rational, permit fee structure, supported by previous studies and established practices in other cities.

This document provides an overview of CII's findings and presents a plan to revise the City's permit fee structure.

REVIEW OF PERMIT PROGRAMS IN U.S. CITIES

A thorough review of charges that several local governments, including the City of Cincinnati, impose on ROW occupants is presented by Nunn and Rubleske (Reference 2). They examined twelve localities that included Austin TX, Chicago IL, Cincinnati OH, Denver CO, Farmers Branch TX, Kansas City MO, Phoenix AZ, Portland OR, St. Louis MO, St. Petersburg FL, Seattle WA, and Santa Barbara County CA. Their research identified six types of fees that the local governments impose on ROW occupants: Application fee, obstruction/disruption fee, excavation/degradation fee, user/rental fee, and franchise fee. A paper presented during the 1998 Annual Conference on Working Session on Municipal Rights-of-Way in Regina, Saskatchewan identified two main categories of costs namely administrative costs and physical costs (Reference 3). As noted in these references, the types and amounts of fees charged considerably vary among different agencies.

The various types of fees identified in these references can be summarized and grouped into four broad categories namely, engineering and administration fees, pavement preservation fees, traffic delay fees, and loss of revenue.

Engineering administration fees recover direct costs of administering the permit program including registering, processing, maintaining data, and cost of inspecting work in ROW. A pavement preservation fee relates to excavation or degradation fees and is meant to recover direct and sometimes indirect costs that result from excavations of ROW surfaces. Traffic delay fees serve to deter and penalize service providers whose ROW work obstructs access or closes streets or sidewalks. This fee recovers the indirect costs to the public caused by the interruption of ROW service. Loss of revenue includes loss of parking meter revenues, vending permits and so on.

In addition, CII conducted an extensive search of available information on the Internet. It was noted that certain agencies lump different fees into one or two groups that make it difficult to isolate the fees into specific groups. However, the authors have tried their best to group the fees into four categories to make it easy to understand the range of fees imposed for a specific category. The details are presented Table 1.

TABLE 1. STREET CUT PERMIT FEES IMPOSED IN VARIOUS CITIES

Agency	Application/Admin. Fee	Inspection Fee	Traffic Delay Fee	Excavation/Degradation Fee
Austin TX	$20 (+$850 for telecom)			$90 per SY
Birmingham AL	$15			
Bolton Town, Canada	$30			
Chicago IL	$145	Included in application fee	$10 per Foot per day	$132
Cincinnati OH	$15	$35 minimum		$10 + $1.00 per SY
Dayton OH	$75	$100 per hour		
Denver CO	$25	Monthly basis	$1.50 per Foot per month	
Duluth MN	$15	$10		
Gainesville FL	$20.16 per Sq. Ft.,			
Indianapolis IN	$20	$35		
Kansas City MO	$42			
Maine NH	$15			New streets $150 up to 25 SY; $140 >25
Oklahoma City OK	$27.50			
Phoenix AZ	$320			Variable scale depending on the age
Portland OR	$186			$0.87/Foot; $7 minimum
Richland WA	$40	$0.25/Sq. Ft.; $200 maximum		$3.00 to $15 per SY depending on the age
Riverside County CA	$20	$80 + $0.10/Ft.		
Sacramento CA				$17 per meter
Seattle WA	$64	$350 minimum	$750 minimum	$0.75 per Foot; $75 minimum
Shrevport CA		$45; $125 per day per inspector for more than one day		
St. Louis MO		$32		
St. Petersburg FL	$150	Actual time		

CINCINNATI'S CURRENT PERMIT FEE PROGRAM

The current permit program covers the cost of administration, inspection and limited street restoration program, as shown in Table 2.

TABLE 2. CURRENT PERMIT FEE PROGRAM

		Fee for 5 SY permit
Administration Fee	$15 per permit	$15
Inspection Fee	$10 per permit + $1.00 per SY	$15
Street Restoration Fee	$35 up to 2 SY + $ 3.00 per SY thereon	$44
TOTAL PERMIT FEE FOR A 5 SY PERMIT		$74

Administration fees cover costs of reviewing applications, coordinating with other departments, preparing paper work, and maintaining records; at an average rate of $25 per hour. Inspection fees cover the costs of travel to the work site and inspection at the work site. The street restoration fee is assessed to compensate for the loss of structural integrity from cutting, excavating and patching of the street pavement.

REVENUE FROM CURRENT PROGRAM

Permit revenues depend on the number of permits issued and total area of opening. The permits issued in Cincinnati are grouped into two categories: (i) maintenance cuts; and (ii) new cuts. Maintenance cuts are those cuts made for the inspection and repair of existing services. New cuts are made to install new services. Maintenance cuts are smaller with an average area of 5 SY. New cuts are larger with an average area of 29 SY. Approximately 4,100 street opening permits are issued each year for maintenance cuts and 900 permits for new cuts. Table 3 illustrates permit revenue from the current permit program in a typical year.

TABLE 3. REVENUE FROM CURRENT PERMIT PROGRAM		
	Fee for 5 SY permit	Fee for 29 SY permit
Administration Fee @ $15 per permit	$15 x 4100 permits = $61,500	$15 x 900 permits = $13,500
Inspection Fee @ $10 per permit + $1.00 per SY	($10 + $1.00 x 5 SY) x 4100 permits = $61,500	($10 + $1.00 x 29 SY) x 900 permits = $35,100
Street Restoration Fee @ $35 up to 2 SY + $ 3.00 per SY thereon	($35 + $3.00 x 3 SY) x 4100 permits = $180,400	($35 + $3.00 x 26 SY) x 900 permits = $101,700
Sub Total	$303,400	$150,300
TOTAL PERMIT REVENUE: $453,700		

ANNUAL EXPENDITURES

The annual expenditures of the permit program comprise of staff time, equipment cost, communication and transportation costs. Table 4 shows estimated annual expenditures of the permit division for providing necessary services.

TABLE 4. ANNUAL EXPENDITURES OF PERMIT PROGRAM	
Work force used to run the permit program is as below: ▸ **11 Inspectors** ▸ **1¼ Engineers (25% of 5 Engineers)** ▸ **1 Typist** ▸ **1 Clerk** ▸ **2 Engineering Technicians (Grade 1 and 3)** ▸ **1 Senior Engineering Technician** ▸ **1 Supervising Engineering Technician**	
Average Annual Salary (including benefits): $65,000	
Total Salary = 18.25 x 65,000	**$1,186,250**
Equipment Costs (like computers and peripherals)	$20,000
Communication (like pagers and cell phones)	$6,000
Transportation	$12,500
TOTAL ESTIMATED ANNUAL EXPENDITURE	$1,224,750

Note: Details of equipment costs, communication costs and transportation costs are provided in the following pages

PROPOSED PERMIT FEE STRUCTURE

Based on the literature review and extensive discussions with the staff of City of Cincinnati, CII proposes the following fee structure:

- Engineering and Administration Fees
  - Permit Processing*
  - Plan Review*
  - Record Keeping & Technical Support*
  - Inspection* & Testing
  - Program Support
  - Field Management
- Pavement Preservation Fees*
- Traffic Delay Fees
- Loss of Revenue

Note: * Suggests that fees from these items are used partially to support the existing program

The Engineering and Administration fees are meant to recover direct costs associated with the permit program. These fees are assessed based on an estimate of staff and equipment needs.

Pavement preservation fees have been derived following an extensive study of performance of street pavements in Cincinnati, construction costs, effects of utility cuts on pavement performance, and loss of pavement life and investment costs due to the utility cuts. The procedure developed in this study for the assessment of pavement preservation fees is unique and makes use of sound engineering principles coupled with logical decisions.

Traffic delay fees are assessed using a software developed by the author for the Ohio Department of Transportation (Reference 5). This software is designed to assist engineers to compute additional user costs to the traveling public due to delays particularly on freeways. However, the same software was used for city streets with a few modifications to the input data. The additional user costs thus computed are used to arrive at traffic delay fees.

Loss of revenue is computed using site specific characteristics. Some examples include revenue for parking meters, vending permits, and so on.

Table 5 presents a summary of proposed fees for a typical 5 SY maintenance cut. Also, shown in the table are fees according to the existing program. The procedures used to set fees for each activity presented in Appendix I.

CONCLUSIONS

An evaluation of Cincinnati's permit program indicates that the revenue generated using the existing fee structure is inadequate to support the program and results in substantial losses to the City. This report suggests improvements to Cincinnati's permit fee structure for the street right-of-way permit program. A new, rational, fee structure has been developed based on the following:

- A review of ROW practices and policies in other communities;
- A field investigation of impact of utility cuts on performance of street pavements by the Cincinnati Infrastructure Institute;
- A study of pavement life and life cycle performance of city street pavements by CII; and
- Extensive discussions with the City's staff.

The proposed fee structure considers all the estimated direct and indirect expenses to support the permit program and to maintain the physical assets. The City should judiciously use the new procedure to revise the existing permit fee and upgrade the permit program.

PROPOSED WORK FOR THE FUTURE

In the future, it is possible to refine the procedure suggested in this report by conducting studies as outlined below:

- Investigate the effect of a structural flow fill on the performance and life of utility cuts and pavements;
- Study the effect of utility cuts in concrete and composite pavements;
- Develop better estimates of life and construction costs of different types of pavements based on their functional classification; and
- Validate the appropriateness of user costs.

REFERENCES

1. Batiks A, Pant P.D., Aktan A.E. and Arudi R.S., "Impacts of Utility Cuts on Performance of Street Pavements", Final Report, Research performed by the Cincinnati Infrastructure Institute for the City of Cincinnati and APWA, 1995.
2. Nunn S and Rubleske J.B. " Pricing the Use of Public Rights-of-Way", Public Works Management and Policy, Vol. 3, No. 4, April 1999, pp: 304 - 316.
3. Discussion paper on Municipal Out-of-Pocket Costs Relating to Telecommunications, FCM 1998 Annual Conference, Regina, Saskatchewan.
4. Arudi R.S., "Impact of Utility Cuts on Performance of Street Pavements - Implementation Report", Report presented to the City of Cincinnati, August 1996.
5. Arudi R.S., Minkarah I.A. and Pant P.D., "User Cost Models for Pavement Maintenance and Rehabilitation Alternatives in Highway Work Zones", Final Report to the Ohio Department of Transportation, State Job No. 14553(0), August 1997.

TABLE 5. SUMMARY OF PROPOSED FEE STRUCTURE (sample calculation shown for a 5 SY permit)		
ENGINEERING AND ADMINISTRATION FEES	**Current**	**Proposed**
Permit Processing (includes one plan review)	$15	$28.00
Plan Review (additional plans/pages)		$12.00 per page (for new construction permits)
Record Keeping & Technical Support		$6.00
Inspection & Testing	$35 up to 2 SY + $3.00 per SY thereon minimum $35.00	$35.00 up to 2 SY + $3.00/SY for area greater than 2 SY + $2.00 (for testing) minimum $37.00
Program Support	$5.00	$8.00
Management		25% of Inspection & Testing minimum $9.00
SUB TOTAL (Minimum Eng. & Admin. Fees) for a maintenance cut	***$55***	***$88***
PAVEMENT PRESERVATION FEES	$5.00 + $1.00 per SY ***($5.00 + $5.00) = $10.00***	***($7.50 per SY x 18.3 SY (affected area)) = $137.25*** (Please refer to Appendix I and Figures 1 through 5 for computation of affected area and fee per Sq.Yd).
TRAFFIC DELAY FEES		depends on street classification ***$20 to $80 per day***
LOSS OF REVENUE		***site specific***
TOTAL PERMIT FEE	**$65.00**	**$245.25 (minimum)**

APPENDIX I

ENGINEERING AND ADMINISTRATION FEES

Item	Description	Annual Cost for 5000 permits	Permit Fee
Permit Processing (includes one plan review)	2 Engineering Technicians, each @ $36,500 per year x 50% time	$36,500	**$28.00 per permit (Assuming 5000 permits per year**
	1 Accountant @ $45,000 per year x 50 % time	$22,500	
	1 Clerk II @ $26,500 per year x 80% time	$21,200	
	1 Engineering Technician @ $42,000 per year x 25% time	$10,500	
	Total Salary	$90,700	
	Benefits on Salary @ 52%	$47,164	
TOTAL ANNUAL COST FOR PERMIT PROCESSING		$137,864	
Item	Description	Annual Cost for 5000 permits	Permit Fee
Plan Review (review of additional plans and/or documents)	1 Engineering Technician II @ $42,000 per year x 25% time	$10,500	Review 900 plans per year, average 10 pages per plan: $104,120/9000 = **$12.00 per page**
	1 Senior Engineering Technician @ $45,000 per year x 100 % time	$45,000	
	1 Engineering Technical Supervisor @ $52,000 per year x 25% time	$13,000	
	Total Salary	$68,500	
	Benefits on Salary @ 52%	$35,620	
TOTAL ANNUAL COST FOR PLAN REVIEW		$104,120	

ENGINEERING AND ADMINISTRATION FEES (Continued)

Item	Description	Annual Cost for 5000 permits	Permit Fee
Record Keeping & Technical Support	1 Clerk II @ $26,500 per year x 20% time	$5,300	**$6.00 per permit**
	1 Systems Computer Program Analyst @ $57,042 x 25 % time	$14,260	
	Total Salary	$19,560	
	Benefits on Salary @ 52%	$10,171	
	Supplies	$2,000	
TOTAL ANNUAL COST FOR RECORD KEEPING AND TECHNICAL SUPPORT		$31,731	

Item	Description	Annual Cost for 5000 permits	Permit Fee
Inspection & Testing	Inspection as defined by the current Street Restoration Handbook schedule		**$35 up to 2 SY + $3/SY for area greater than 2 SY**
	Testing (see the table on next page for details)	$8,856	**$2.00 per permit**

ENGINEERING AND ADMINISTRATION FEES (Continued)

Item	Description	Annual Cost for 5000 permits	Permit Fee
Program Support (Includes equipment cost and cost of incidental supplies)	35 Technical Equipment Systems (like computer, printer, plotter, scanner, copiers, data storage systems etc., including software) at an average cost of $2,285 per system = $79,975; Replace every four years	$20,000	**$8.00 per permit**
	Communication @ $500 per month (15 pagers @ $9 per month, 13 cell phones @ $28 per month)	$6,000	
	Transportation: 10 vehicles @ $1,250 per year per vehicle	$12,500	
TOTAL ANNUAL COST FOR PROGRAM SUPPORT		$38,500	

Item	Description	Annual Cost for 5000 permits	Permit Fee
Management	25% of Inspection and Testing		**$9.00 minimum per permit**

NOTE: Need to add the cost of : (i) line painting (ii) graphics and (iii) emergency response

TESTING

	Number of Tests	Unit Cost	Total Cost for 5000 permits
Asphalt Content	24 random tests in a calendar year @ one set per month's production, (10 for maintenance cuts and 10 for capital/major permits)	$26	$624
Field Density (field test)		$32/day with Nuclear Meter + Technician time $28/hour x 4 hours = $144	$3,456
Asphalt Mix Marshal Design (sample collected at the source)		$58	$1,392
Concrete Cylinder Test (sample is collected at the source or in the field)		$87	$2,088
Concrete Slump Test (field test)		$54	$1,296
		Total Per Year	$8,856
		TOTAL PER PERMIT (assuming 5000 permits in a year)	**$2.00**

PAVEMENT PRESERVATION FEES

Pavement preservation costs are assessed to compensate for the loss of structural integrity of street pavements resulting from the cutting, excavating and patching of the street pavement. Some of the most important factors to be considered for the assessment of these costs are: (i) type of pavement; (ii) life of street pavement with and without utility cuts; and (iii) cost of pavement construction.

Pavement Types

The different types of pavements in the city can be classified into three broad categories namely, (i) flexible pavements (asphalt concrete surface layers over a granular base), (ii) rigid pavements (Portland cement concrete surface), and (iii) composite pavements (asphalt concrete surface layers over concrete, brick, or stone). Flexible pavements are about 46% of Cincinnati's street network while composite pavements make up 49%. The remaining 5% of the network is composed of rigid pavements. The life cycle characteristics of each type of pavement including design considerations, construction and maintenance costs, performance characteristics, life, and so on, vary for each type of pavement.

Effect of Utility Cuts on Pavement Life

The city of Cincinnati's pavement design method deals with estimating the needed thickness of given materials to achieve a certain "life" of the pavement. The design system is rather vague on the definition of "pavement life". A pavement's life may refer to a time when its condition is no longer acceptable for safe driving. However, most often, owing to different policies and practices, pavements receive a restorative treatment before this time. In such a case, pavement life is referred to as "pavement service life". The pavement service life signifies the frequency of resurfacing or reconstruction. Setting up tables of pavement service life for different types of street pavements in Cincinnati is a complex task. However, an attempt was made to generate a table of pavement service life for Cincinnati using the limited information available, based on frequency of resurfacing as observed in the past and the experience of the City's engineers. Thus, in consultation with the Engineering Division, the pavement service life is established as twenty years for major roads and twenty-five years for local roads with an overall average of twenty-two years, irrespective of type of pavement. Further research is needed to establish more realistic values for each type of pavement based on their composition and functional classification.

The study conducted by CII between January 1991 and 1995 for the City of Cincinnati on flexible pavements reported that existing utility cut restoration practices seriously affect pavement performance, life and structural integrity (Reference 1 and 4). A major impact is structural weakening. As a result, street pavements with cuts exhibit a 33% loss in their remaining service life. This will mean that, the remaining service life is reduced to 67%. For example, if a pavement is five years old, normally its remaining service life would be (22 - 5) = 17 years. If this pavement is subjected to a utility cut, the affected area will have a service life of (17 years x 67%) = 11 years. Although the restorations made in pavements that are very near to the end of their service life may perform better than surrounding pavements, it is assumed due to lack of data that utility cuts result in a 33% loss of remaining life, despite the pavements' age. It is important to recognize that the utility cuts investigated by CII were all restored using granular backfills. In recent years, some utilities have started using structural flow fill as a backfill material. It is very important to further research the applicability of the above finding to cuts restored with structural flow fill.

CII reported an insignificant effect of cuts on rigid pavements, owing to current restoration practices. No studies were made on cuts in composite pavements.

Performance of Pavements With and Without Utility Cuts

When a pavement is constructed, its condition will be at its best during the early years and will gradually deteriorate with time. A typical pavement performance curve for street pavements in Cincinnati in shown in Figure 1. Pavement performance is shown as 'Pavement Condition Rating (PCR)' on a scale of 0 through 100, with 100 representing the best condition. When a cut is made in a pavement, the affected area of the pavement will be subjected to a loss of 33% in its remaining service life. Figure 2 illustrates the effect of cuts on the service life of pavements over their affected area. For example, let us say that a cut is made in a 10 year old pavement that has a PCR of 84. The effect of cut would be to reduce its PCR to 68 soon after the restoration and its remaining service life to 12 years. This results in a loss of four years service life.

As stated before, this study assumed a 33% loss in pavement service life due to cut, irrespective of the current condition of pavement. The validity of this assumption needs should be verified in the future by collecting additional field data.

Effect of Utility Cuts on Pavement Costs

The capital costs of construction or replacement may be used to assess the economic impact of utility cuts on street pavements. According to the data gathered by the Engineering Division, the cost of construction of a typical flexible pavement in Cincinnati is approximately $65 per square yard.

Analogous to the pavement condition (PCR), pavement costs also decrease with time as illustrated in Figure 3. At the end of 22-years, the pavement cost will reach a value of $12 per square yard. If a cut is made in year 1, the affected area of the pavement will reach the end of its service life after (22 years x 67%) = 15 years because of a 33% loss in service life due to the cut and its cost will at that period be $12 per square yard. In this pavement, if there was no cut, its cost at the end of 15 years would have been $41 per square yard. Therefore there is a loss in pavement cost equal to ($41 - $12) = $29 per square yard. Please see Figure 4 for a sample calculation of loss in pavement cost due to a cut made in a 10 year old pavement. The loss varies from zero to $29 per square yard depending on service life of pavement when a cut is made and the average loss over the life is $15 per square yard as shown in Figure 5.

Since CII reported that cuts in concrete pavements exhibited insignificant effect on pavements and that the composite pavements were not investigated, in consultation with the Engineering Division, it was decided to assume the loss in pavement costs due to cuts in these pavements to be equal to zero. Permit fees due to loss in pavement costs is taken as 50% of $15 per square yard ($7.50 per square yard) since flexible pavements make up nearly 50% of street network. Despite type of pavement, its age or condition, it is thus recommended that pavement preservation costs be assessed at the rate of $7.50 per square yard of the affected area.

Affected Area

The CII study (Reference 1) recognized that the utility cuts affect an area of pavement equal to an off set of three feet around the utility cut, as shown in Figure 6. Therefore, it is recommended that the total affected area of the pavement be considered for the assessment of permit fees.

TRAFFIC DELAY FEES

The University of Cincinnati conducted a study in cooperation with the Ohio Department of Transportation to develop models for the computation of costs associated with traffic lane closures and delays to the traveling public (Reference 5). A computer program was developed to help the ODOT engineers for computing user costs due to increase in (i) operating costs; and (ii) travel time costs. This software was used with a few modifications to the input data. The results are presented in Column 2 of the Table on next page for various classes of streets. In consultation with the Engineering Division, it was decided to charge the utilities only 10% of the fees (Column 3). If the utilities continue to close the traffic lanes beyond the scheduled days, the traffic delay fees would be equal to the amount presented in Column 2 of the table.

Street Classification	Delay Fee per day	Fee per permit per day (@ 10% of delay fee) for the scheduled days
Class I Expressways	$800	$80
Class II Arterial State Highways	$600	$60
Class III Arterial Through Streets	$500	$50
Class IV Collector Streets	$300	$30
Class V Local Service Streets	$200	$20

Note: For the days beyond the scheduled days, traffic delay fees will be equal to actual delay costs (as shown in Column 2 above)

Figure 1. Performance of a typical Pavement (with no cuts)

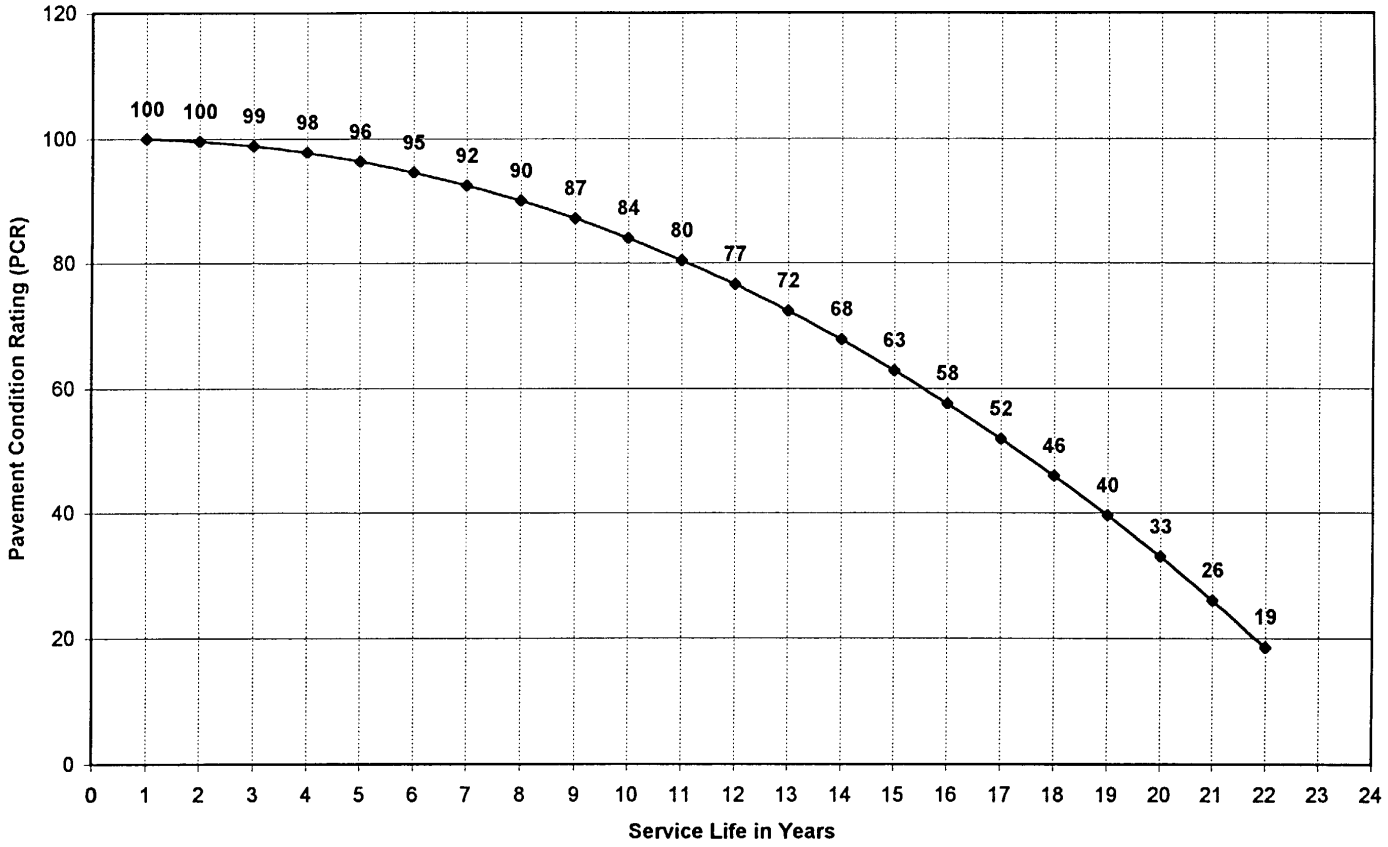


Figure 2. Effect of Utility Cuts on Pavement Performance

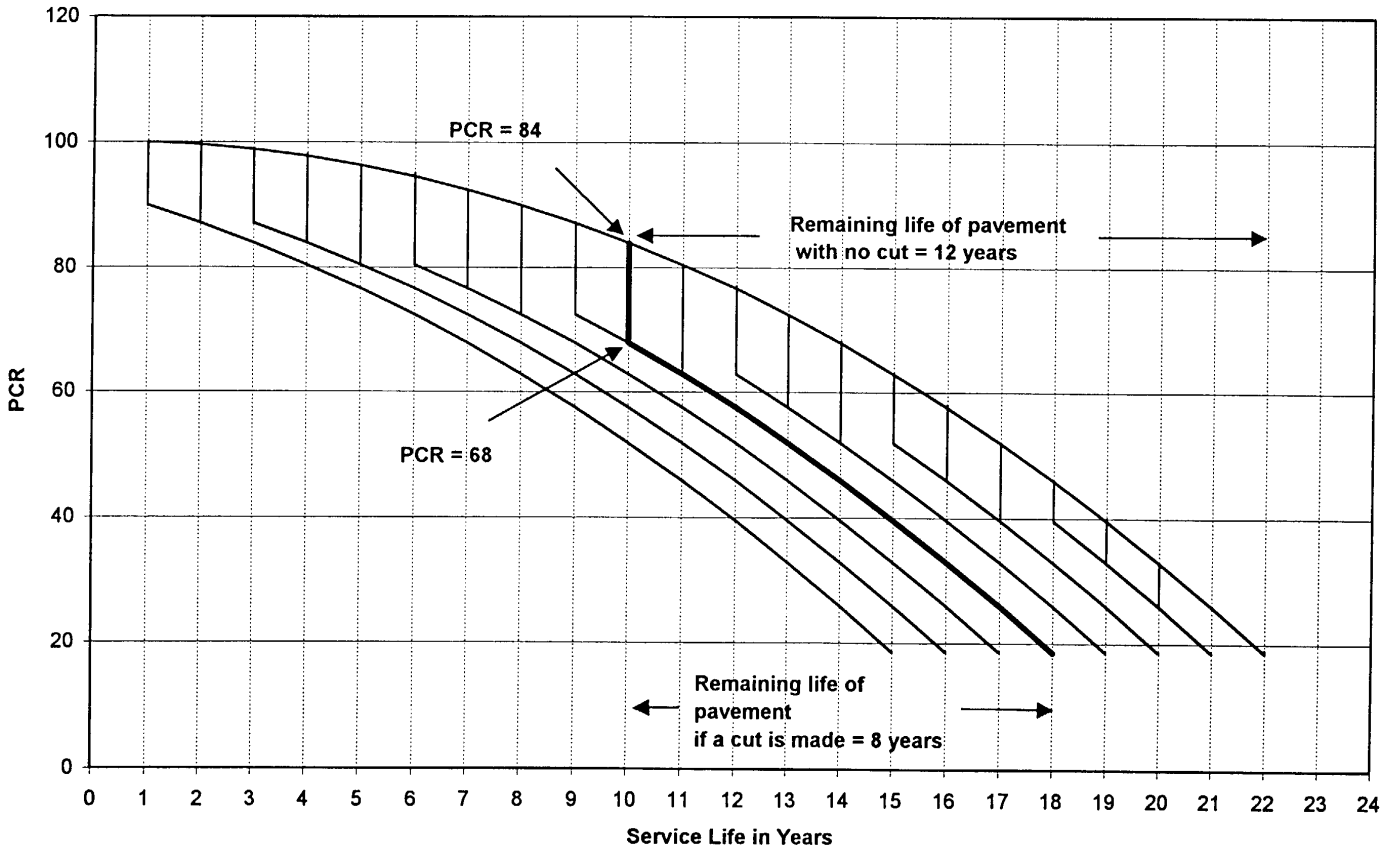


Figure 3. Typical Construction and Residual Costs of a Pavement per Sq. Yd. (No Cuts)

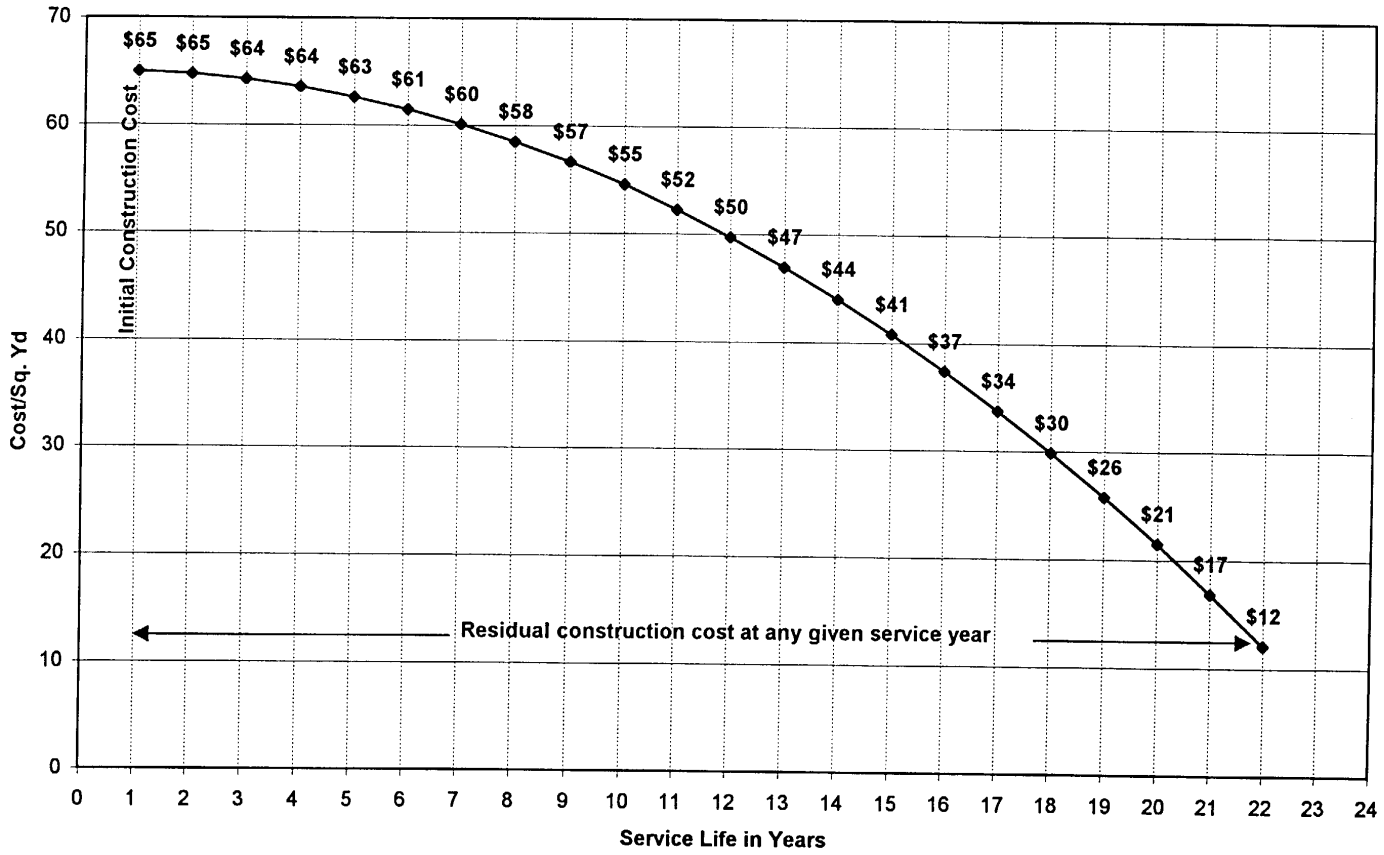


Figure 4. Effect of Utility Cut on Residual Construction Cost, per SY

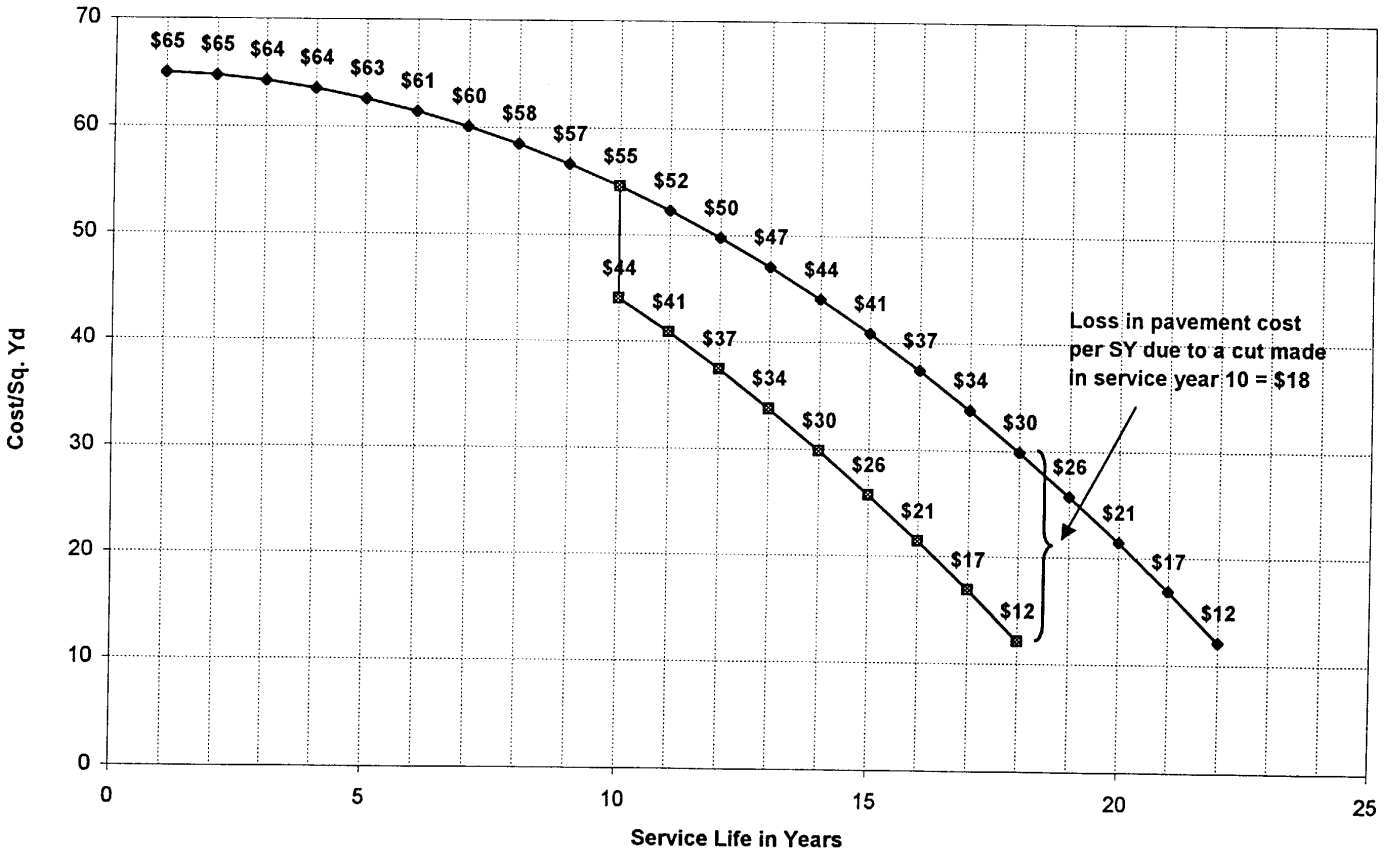
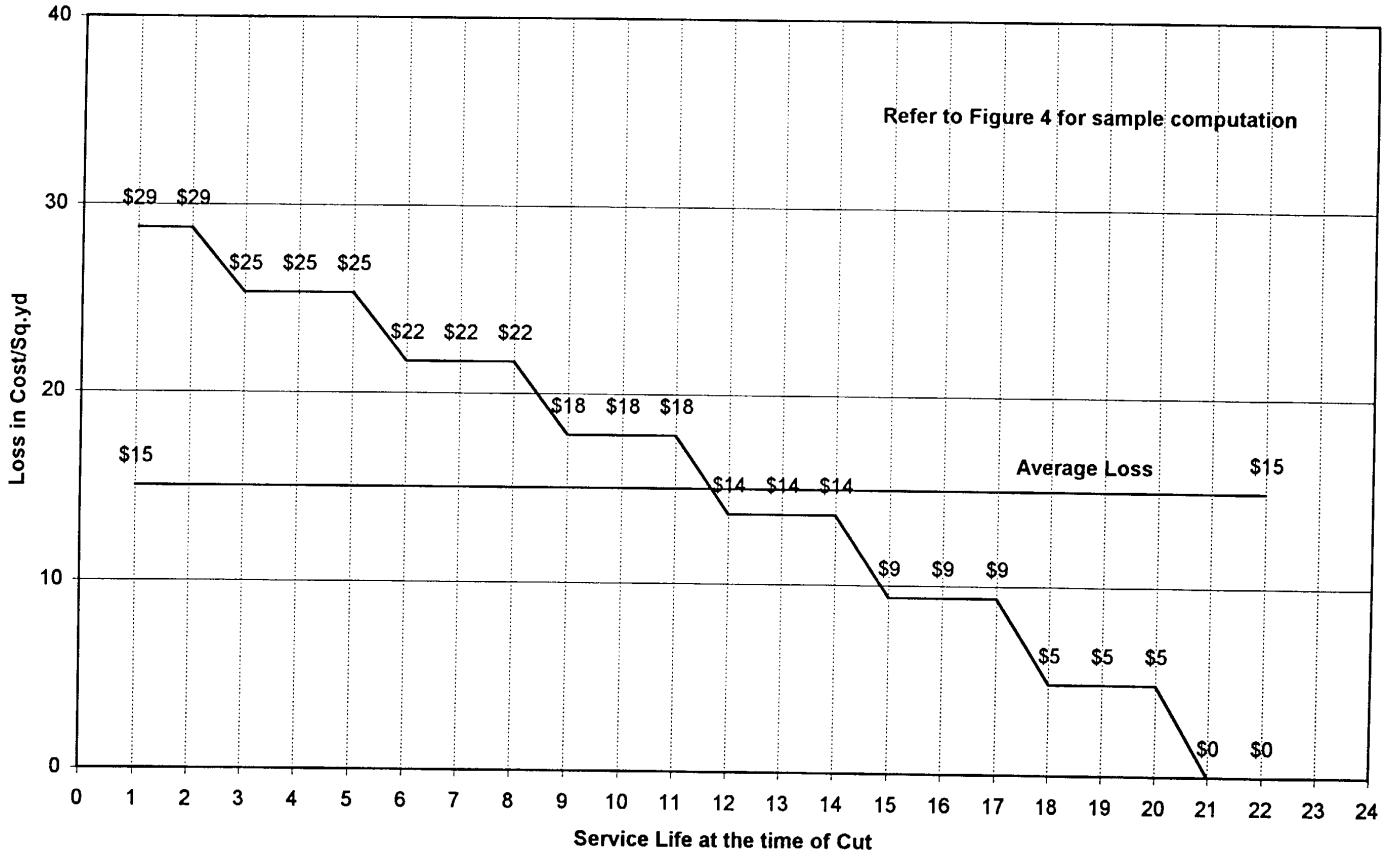


Figure 5. Loss in Pavement Construction Cost due to Cuts



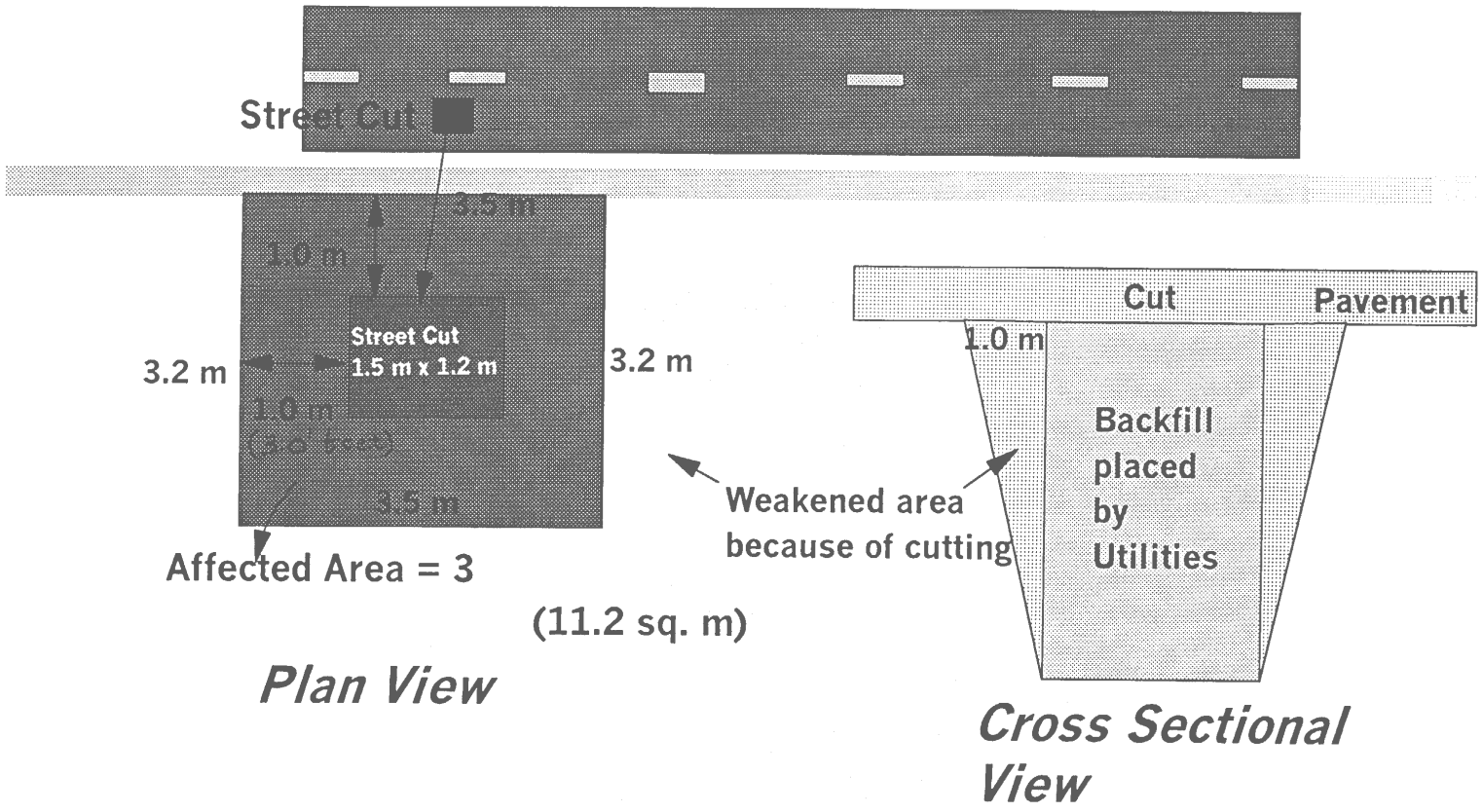


Figure 6. Affected Area of Pavement